wherein:

B is a nucleoside base;

any alkyl portion of R_1', R_3', R_4' and R_5' is C1 to C10, linear, branched, saturated or unsaturated;

any aryl portion of R_1', R_3', R_4' and R_5' is a phenyl, polycyclic ring or heterocycle;

R_2 is selected from the group consisting of H, OH, alkoxy, aralkoxy and aryloxy; and

and X is O;

(I) where R_3 and R_5 are independently selected from the group consisting of OH, OCEPA and a hydroxyl blocking group:

(A) where:

R_1' is selected from the group consisting of N_3, NO_2, CF_3, alkyl, substituted alkyl, aralkyl, substituted aralkyl, aryl, and substituted aryl, where the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of NO_2, N_3, CF_3, SH, SR, COOH, COOR, SO_3H, SO_3R, F, Cl, Br, and I, where R is selected from lower alkyl, aralkyl and aryl; and

R_3', R_4' and R_5' are all H;

(B) where:

R_3' is selected from the group consisting of CN, N_3, NO_2, CF_3, substituted alkyl, aralkyl, substituted aralkyl, aryl, and substituted aryl, where the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of CN, N_3, CF_3, NH_2, NR_2, OR, SH, SR, COOH, COOR, SO_3R, F, Cl, Br, and I, where R is selected from lower alkyl, aralkyl and aryl; and

R_1', R_4' and R_5' are H;

(II) where:

one of R_3 and R_5 is an internucleotide linkage and the other is selected from the group of OH, an internucleotide linkage and a hydroxyl blocking group;

R_1' is H; and

two of R_3', R_4' and R_5' are H and the other is modified as set forth below:

(A) R_4' is selected from the group consisting of substituted alkyl, substituted aralkyl, aryl, and substituted aryl, a highly electronegative radical, CF_3 and NO_2, where R_4' does not comprise a label; and

the substituted portion of the substituted alkyl and substituted aralkyl is other than OH, CHO, SH, NH_2, COOH and $NHC(O)CF_3$;

(B) when R_5 is an internucleotide linkage;

R_5' is selected from the group consisting of substituted alkyl, aralkyl, substituted aralkyl, aryl, and substituted aryl; and

the substituted portion of the substituted alkyl is other than NH_2 and epoxyethyl; and

(C) R_3' is selected from the group consisting of substituted alkyl, aralkyl, substituted aralkyl, aryl, and substituted aryl; and

the substituted portion of the substituted alkyl is other than OH;

56. (Original) The compound of claim 55 which satisfies grouping I(A).

57. (Original) An oligonucleotide containing the nucleoside of claim 56.

58. (Original) The compound of claim 55 which satisfies grouping I(B).

59. (Original) An oligonucleotide containing the nucleoside of claim 58.

60. (Original) The compound of claim 55 which satisfies grouping II(A).

61. (Original) An oligonucleotide containing the nucleoside of claim 60.

62. (Original) The compound of claim 60, wherein the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of NH_2, NHR', NR'R" and $^+$NR'R"R'" where R', R" and R'" are independently selected from the group consisting of lower alkyl and lower alkylcarbonyl.

63. (Original) The compound of claim 60, wherein the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of CN, NO_2, N_3, halogen, OR', SH and SR' where R' is selected from the group consisting of lower alkyl and lower alkylcarbonyl.

64. (Original) The compound of claim 60, wherein the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of COOH, COOR' and CONR'R" where R' and R" are independently selected from the group consisting of lower alkyl, aralkyl and aryl.

65. (Original) The compound of claim 60, wherein the substituted alkyl, substituted aralkyl and substituted aryl independently comprise a linker which is attached to at least one of a functional moiety, an artificial nuclease, a cross-linking reagent, an intercalator, and a reporter molecule.

66. (Original) The compound of claim 55 which satisfies grouping II(B).

67. (Original) The oligonucleotide of claim 66, wherein the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of NHR', NR'R" and $^+$NR'R"R'" where R', R" and R'" are independently selected from the group consisting of lower alkyl and lower alkylcarbonyl.

68. (Original) The oligonucleotide of claim 66, wherein the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of CN, NO_2, N_3, halogen and SR' where R' is selected from the group consisting of lower alkyl and lower alkylcarbonyl.

69. (Original) The oligonucleotide of claim 66, wherein R_4' is selected from the group consisting of a highly electronegative radical, CF_3 and NO_2.

70. (Original) The compound of claim 55 which satisfies grouping II(C).

71. (Original) The oligonucleotide of claim 70, wherein the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of NHR', NR'R" and $^{+}$NR'R"R'" where R', R" and R'" are independently selected from the group consisting of lower alkyl and lower alkylcarbonyl.

72. (Original) The oligonucleotide of claim 70, wherein the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of CN, NO_2, N_3, halogen, OH, OR', SH and SR', where R' is selected from the group consisting of lower alkyl and lower alkylcarbonyl.

73. (Original) The oligonucleotide of claim 70, wherein the substituted portion of at least one of the substituted alkyl, substituted aralkyl and substituted aryl is selected from the group consisting of COOH, COOR' and CONR'R", where R' and R" are independently selected from the group consisting of lower alkyl, aralkyl and aryl.

74. (Original) The oligonucleotide of claim 70, wherein the substituted alkyl, substituted aralkyl and substituted aryl independently comprise a linker which is attached to a least one of a functional moiety, an artificial nuclease, a cross-linking reagent, an intercalator, and a reporter molecule.